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Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	)	
	)	
Allocation of Spectrum Below	)	
5 GHz Transferred From	)	ET Docket No. 94-32
Federal Government Use	)	

TO: The Commission

REPLY COMMENTS OF SYMBOL TECHNOLOGIES, INC.

1. Symbol Technologies, Inc. ("Symbol"), a major manufacturer of Part 15 spread spectrum data communications equipment, hereby submits these Reply Comments in the above-captioned proceeding.[1/] Symbol's comment in the first round opposed the Commission's proposal to eliminate Part 15 operations from the 2402-2417 MHz band as contrary to the public interest, and supported the alternative proposal to limit licensed services to protect Part 15.[2/] Symbol maintains that position here, and also supports the proposal of Apple Computer, Inc. for an unlicensed data PCS allocation in the 2390-2400 MHz band.

[1/] Allocation of Spectrum Below 5 GHz, ET Docket No. 94-32, Notice of Proposed Rule Making, FCC 94-272 (released Nov. 8, 1994).

[2/] Comments of Symbol Technologies, Inc. (filed Dec. 19, 1994). Symbol also opposed the coexistence of licensed services and Part 15 in the band but urged the Commission, if it chooses that approach, to protect Part 15 operations by (a) prohibiting high-powered, wideband transmitters in the 2402-2417 MHz band, and (b) deeming a properly certified Part 15 device not to be a source of harmful interference to a licensed user. Id.

A. THE RECORD SUPPORTS SYMBOL'S OPPOSITION TO ANY ALLOCATION THAT WOULD THREATEN PART 15 SPREAD SPECTRUM OPERATIONS AT 2402-2417 MHz.

2. Fifty-eight of the timely comments filed in this proceeding address the Commission's proposals for 2402-2417 MHz. Fully 47 of these seek to limit licensed operations in the band, and 28 specifically urge protecting Part 15 operations.[3/] Eleven commenters favor using the band for traditional licensed services, but only two of those are willing to bid for the spectrum.[4/] Seldom does the Commission see so clear a consensus: 97% of the parties commenting on 2402-2417 MHz oppose auctions in the band, and 81% oppose licensed services altogether.

3. The commenters seeking allocations for licensed services do not, for the most part, make any substantial effort to show that their existing allocations are insufficient. Instead, these parties argue that the FCC's statutory authority to conduct auctions does not extend to the parties' services, and argue further that third-party carriers operating under market forces cannot meet their needs. Missing from these comments, however, are data that show an urgent shortage of spectrum.

[3/] Of the remaining 19, 12 fear interference to amateur radio and two to radio astronomy, while two warn about interference from ISM to licensed services. Three other comments propose allocating the band for a low-power video service.

[4/] The suggested applications include rural telephone, mobile satellite service, wireless cable, pubic safety (including video operations), manufacturing, industrial, railroads, and forestry. Both of the comments supporting auctions were filed by wireless cable interests; but the largest wireless cable operator in the United States attests that this band is not suitable for wireless cable. Comments of American Telecasting, Inc. at 5 (filed Dec. 19, 1994).

There are no data, for example, on channel loading, blocked calls, or waiting time for channels. Thus, even if the Commission accepts the argument that these services -- public safety, manufacturing, railroads, forestry, etc. -- are entitled to additional non-auctioned allocations of their own, the parties have still failed to establish the need for such allocations.

4. The few parties that do attempt to justify an allocation fail to carry their burden. First, an applicant to provide low-earth-orbit (LEO) satellite service speculates on its future market numbers and assumes a ratio of needed bandwidth per subscriber, then multiplies the two numbers to project that it will require more bandwidth than the LEO allocations provide.[5/] But the comment justifies neither the market numbers nor the bandwidth requirements, so its ultimate conclusion remains unsupported. Second, a rural telephone provider seeks spectrum for delivery of voice, data, and video to remote areas, and argues that there are no practical alternatives for delivery of video.[6/] But existing services such as BETRS and cellular telephone should suffice for voice and data,[7/] at least in this

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[5/] Comments of Loral-Qualcomm Partnership, L.P. (filed Dec. 19, 1994) at 6-7.

[6/] Comments of Leaco Rural Telephone Cooperative (filed Dec. 19, 1994).

[7/] BETRS (Basic Exchange Telecommunications Radio Service) substitutes a two-way radio link for the subscriber's local loop in places where running a wire to the subscriber's premises is not practicable. BETRS is regulated under Part 22 of the Rules.

provider's service area,[8/] so the comment amounts to a request for unauctioned spectrum for wireless cable. Seen in that light, there are serious doubts as to whether the proposal would be in the public interest.[9/] Third, three public safety entities seek use of the band for helicopter-to-ground video transmission. None of these, however, attempts to show a lack of other suitable video frequencies. To the contrary, these commenters seem to assume (without so stating) that to share frequencies with other users would be inconsistent with their mission. The Commission has long protected public safety voice and data frequencies from other users, but it does not necessarily follow that public safety video transmissions deserve the same near-absolute degree of priority. Certainly the present record does not address this issue.

5. Finally, the comments that seek to use the band for traditional licensed services run counter to an inevitable historical trend. When private radio began to proliferate after the Second World War, the Commission adapted the same licensing model it used for broadcast stations: Each private radio base station (or fixed station) was granted a monopoly on its

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[8/] The provider serves 900 customers spread over 4,500 square miles. Comments of Leaco Rural Telephone Cooperative at 1 n.1.

[9/] The delivery of video signals to residences is becoming a highly competitive industry: Cable, wireless cable, telephone, and direct satellite providers are all positioning to vie for the market. Awarding free spectrum to one sub-category of contenders, as this party requests, would raise policy issues that exceed the scope of this proceeding.

frequency over thousands of square miles,[10/] even though the station could communicate with only one unit at a time. For several decades the inefficiency of this arrangement was accommodated by opening higher frequencies bands as the lower ones filled up. But eventually the laws of physics called a halt: Frequencies much above 1 GHz can propagate only a relatively short distance. It is no coincidence that cellular technology, which deliberately limits the transmission range so as to reuse the same frequency nearby, appeared at just about the time the Commission ran out of spectrum below 1 GHz. The trend since then (PCS is one example) has been toward lower-power transmitters reusing frequencies over shorter distances. This has two advantages: The 1 GHz ceiling is irrelevant to short-range transmissions, so higher frequencies are available; and frequencies can be reused a few city blocks away, or even a few buildings away, thus accommodating many more end users. The shift toward lower-power transmitters also eased the Commission's burden by making blanket licenses practical, so that one license suffices to regulate thousands of users.

6. Part 15 devices, and particularly spread spectrum, are the ultimate extension of this trend: transmitters whose power is so low, and whose range is so short, that they need not be licensed at all. The number of end users capable of sharing a

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[10/] A base station with a protected radius of 35 miles has exclusive use of its frequency over almost 4,000 square miles. Doubling the radius to 70 miles quadruples the area to over 15,000 square miles.

frequency band in a limited area becomes extremely large. Each user can tailor its service precisely to its own requirements, either on its own or through a third-party provider. And the Commission's regulatory burden drops to nothing more than a one-time equipment certification. By any measure, Part 15 spread spectrum offers an extremely efficient use of the spectrum. None of the other proposals for the 2402-2417 MHz band can come close to serving as many users as well.

B. THE COMMISSION SHOULD ALLOCATE 2390-2400 MHz FOR UNLICENSED DATA PCS.

7. Symbol strongly supports the proposal of Apple Computer, Inc. ("Apple") that the Commission allocate the 2390-2400 MHz band for unlicensed data Personal Communications Services ("PCS").[11/]

8. In the Second Report and Order on PCS, the Commission decided that "the proposed 20 MHz allocation for unlicensed services is not sufficient to accommodate the projected demand for unlicensed PCS services," and doubled the allocation to 40 MHz at 1890-1930 Mhz.[12/] On reconsideration, the Commission redrew the PCS band plan and cut back the unlicensed allocation to 1910-1930 MHz, or 20 MHz, half of which (1910-1920 MHz) is earmarked for data services.[13/] But the Commission did not

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11/ Comments of Apple Computer Inc. (filed Dec. 19, 1994).

12/ Personal Communications Services, 8 FCC Rcd 7700, 7735, 7783 (1993).

13/ Personal Communications Services, 9 FCC Rcd 4957, 4990-91, 5037 (1994).

second-guess its earlier determination that unlicensed PCS needs 40 MHz overall. To the contrary, the Commission stated,

> This does not diminish our concern that there be sufficient spectrum allocated for unlicensed PCS devices to accommodate expected demand, and therefore as noted above, we are committed to instituting a further rule making for this purpose to meet the long term requirements for unlicensed PCS devices, including those potential unlicensed uses that may not be accommodated readily in the initial 20 MHz allocation.[14/]

The present proceeding is one of very few opportunities in the foreseeable future for the Commission to make good on this commitment.

9. The Commission has never doubted the importance of unlicensed PCS,[15/] or that "the early introduction of nomadic [unlicensed] PCS devices is desirable."[16/] But Apple correctly notes that unlicensed data PCS cannot begin operations at 1910-1920 MHz any time soon -- not until all of the incumbent microwave users have been relocated, and that will take several years.[17/] Even with its population of amateur stations, 2390-2400 MHz represents the best opportunity for prompt delivery of unlicensed PCS data services.

10. None of the other proposals for use of this band makes a compelling case. Most of the requests for 2390-2400 MHz also

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[14/] Id., 9 FCC Rcd at 4991.

[15/] See, e.g., Personal Communications Services, 8 FCC Rcd at 7734-7740.

[16/] Id., 8 FCC Rcd at 7740.

[17/] See Comments of Apple Computer Inc. at 4-5.

asked for 2402-2417 MHz, and so are disposed of in Part A above.[18/] Another request for 2390-2400 MHz comes from a private radio interest seeking spectrum for railroad, package delivery, and airline operations, but it does not show existing private radio spectrum to be inadequate.[19/] One brief comment seeks 2390-2400 MHz for licensed PCS services, based on an unsupported (and highly premature) speculation that the demand for licensed PCS services may exceed the capacity.[20/]

11. The other requests for 2390-2400 MHz come in two categories. First, nine telephone interests seek to pair this band with 2300-2310 MHz to provide a wireless local loop service that would supplement BETRS and possibly some cable plant. But it is far from clear that this expenditure of spectrum is warranted. Wireless local loop service would largely duplicate the function of broadband licensed PCS, for which the Commission has allocated a full 120 MHz.[21/] Moreover, the record in this proceeding shows that wireless local loops operate successfully at 38 GHz,[22/] which is unsuitable for data PCS. Finally, the

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[18/] These include rural telephone, mobile satellite service, wireless cable, and various private land mobile services.

[19/] Comments of the Personal Communications Industry Ass'n (filed Dec. 19, 1994).

[20/] Comments of Pacific Bell Mobile Services (filed Dec. 19, 1994).

[21/] Personal Communications Services, 9 FCC Rcd at 5082 (band plan).

[22/] Comments of Avant-Garde Telecommunications, Inc. (filed Dec. 19, 1994).

proposal would require eliminating all amateur radio operators from both 2300-2310 and 2390-2400 MHz.[23/] Such a step would flatly contravene the Commission's long-held policies in support of the Amateur Radio Service and is not justified here. Second, four commenters want to use 2390-2400 MHz to provide "live" in-flight entertainment services. But a very large fraction of airplane seats are routinely occupied by a very small fraction of the public, so most of the advantage of this service would go to a small elite. Furthermore, most flights longer than an hour or two already offer movies and a variety of audio channels, along with air-to-ground telephone. The public interest in the incremental benefit of "live" over taped entertainment for the benefit of a small group would be very small.

12. In short, an allocation of the 2390-2400 MHz band to unlicensed data PCS is fully justified and would permit that service to commence operation years earlier than otherwise. None of the other suggestions for this band has shown itself to be in the public interest.

CONCLUSION

13. For the reasons set out above, the Commission should limit licensed services in the 2402-2417 MHz band to protect

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[23/] Comments of Southwestern Bell Telephone Co. at 7 (filed Dec. 19, 1994).

Part 15 operations, and should adopt Apple's proposal for an unlicensed data PCS allocation in the 2390-2400 MHz band.

Respectfully submitted,

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